CLAIMS

1. A substrate processing apparatus characterized by comprising:

a reaction container which processes a plurality of substrates;

a heater which heats said plurality of substrates; and

at least one nozzle through which reaction gas is supplied into said reaction container, wherein

said nozzle is attached to said reaction container with said nozzle penetrating a wall of said reaction container, and a flow-path cross-sectional area of a portion of said nozzle that is opposed to at least said heater is greater than a flow-path cross-sectional area of the nozzle-attaching portion.

2. A substrate processing apparatus as recited in claim 1, characterized in that a cross-sectional shape of the portion of said nozzle that is opposed to at least said heater is formed into a squashy circular shape.

3. A substrate processing apparatus as recited in claim 2, characterized in that said cross-sectional shape of the attaching portion of said nozzle is formed into a circular

shape.

4. A substrate processing apparatus as recited in claim 1, characterized in that a cross-sectional shape of a portion of said nozzle that is opposed to at least said heater is formed into substantially elliptic shape, and a short axis thereof is oriented toward a central portion of the substrate.

5. A substrate processing apparatus as recited in claim 4, characterized in that a cross-sectional shape of said attaching portion of said nozzle is formed into a circular shape, and a diameter thereof is made smaller than said short axis.

6. A substrate processing apparatus as recited in claim 1, characterized in that a cross-sectional shape of a portion of said nozzle that is opposed to at least said heater is formed into a shape in which a width of the portion of said nozzle in a direction of a straight line connecting a center of the substrate and a center of the nozzle with each other is smaller than a width of the portion of the nozzle in a direction perpendicular to the straight line direction.

7. A substrate processing apparatus as recited in claim

6, characterized in that the cross-sectional shape of said attaching portion of said nozzle is formed into a circular shape, a diameter thereof is smaller than a width of said nozzle in the direction of the straight line connecting the center of the substrate and the center of said nozzle with each other.

8. A substrate processing apparatus as recited in claim 1, characterized in that said nozzle includes a horizontal portion extending in a horizontal direction and a vertical portion rising in a vertical direction, said horizontal portion is attached to a sidewall of said reaction container, and a portion of the vertical portion is opposed to said heater.

9. A substrate processing apparatus as recited in claim 1, characterized in that said reaction gas is a film-forming gas, and said processing is a film-forming processing.

10. A substrate processing apparatus as recited in claim 1, characterized in that said reaction gas is SiH_4, and said processing is a film-forming processing of a silicon film.

11. A substrate processing apparatus as recited in claim 1, characterized in that said nozzle comprises a plurality of nozzles having different lengths.

12. A substrate processing apparatus as recited in claim 11, characterized in that said heater is divided into a plurality of heater zones, and when said substrate is processed, temperatures in the reaction container corresponding to the respective heater zones are maintained at the same temperatures.

13. A substrate processing apparatus as recited in claim 12, characterized in that said reaction gas is SiH_4, and said processing is a film-forming processing of a silicon film.

14. A substrate processing apparatus as recited in claim 13, characterized by comprising:

when the substrate is processed, said heater maintains temperatures in said reaction container corresponding to the respective heater zones in a range of 650 to 670°C.

15. A producing method of a semiconductor device characterized by comprising:

a step for transferring a substrate or a substrates into a reaction container,

a step for processing the substrate or substrates by supplying reaction gas into a reaction container through a

nozzle which is attached to said reaction container such that the nozzle penetrates a wall of the reaction container and in which a flow-path cross-sectional area of a portion of the nozzle opposed to at least a heater is greater than a flow-path cross-sectional area of the attaching portion, and

a step for transferring the processed substrate or substrates out from the reaction container.